Sentinel North

TAKUVIK

ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG

Christian Katlein

Observing a changing Artic: Optical technologies for sea ice monitoring

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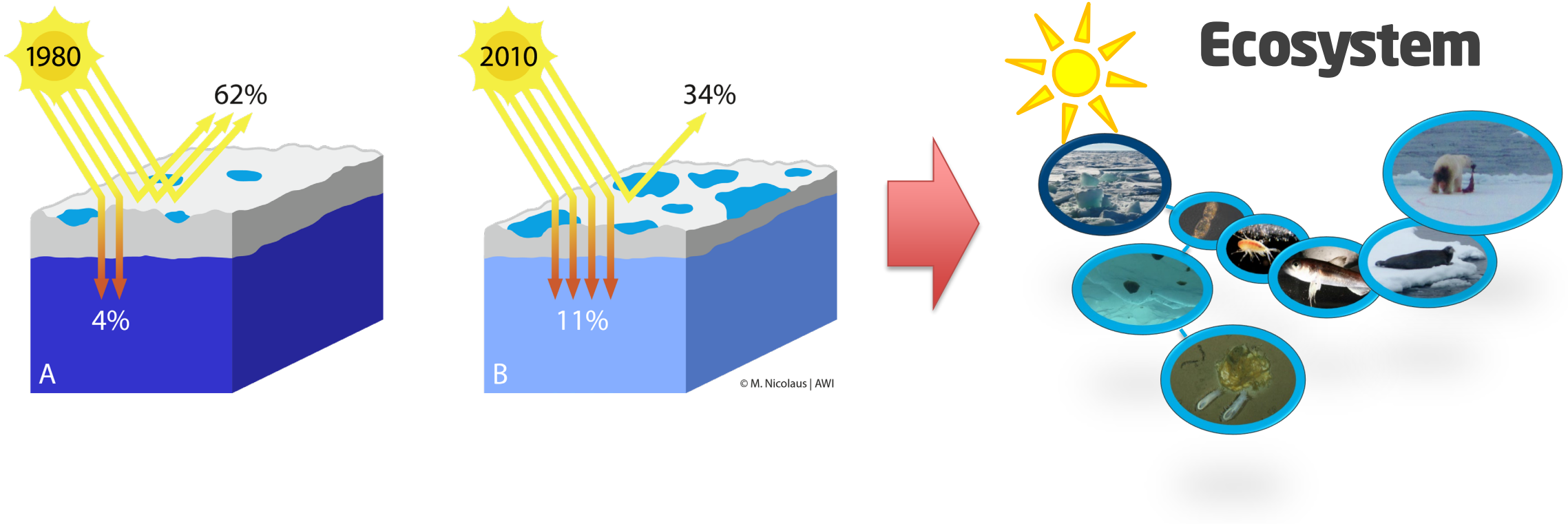
Monitoring the changing sea ice system



Technological challenges in the polar regions:

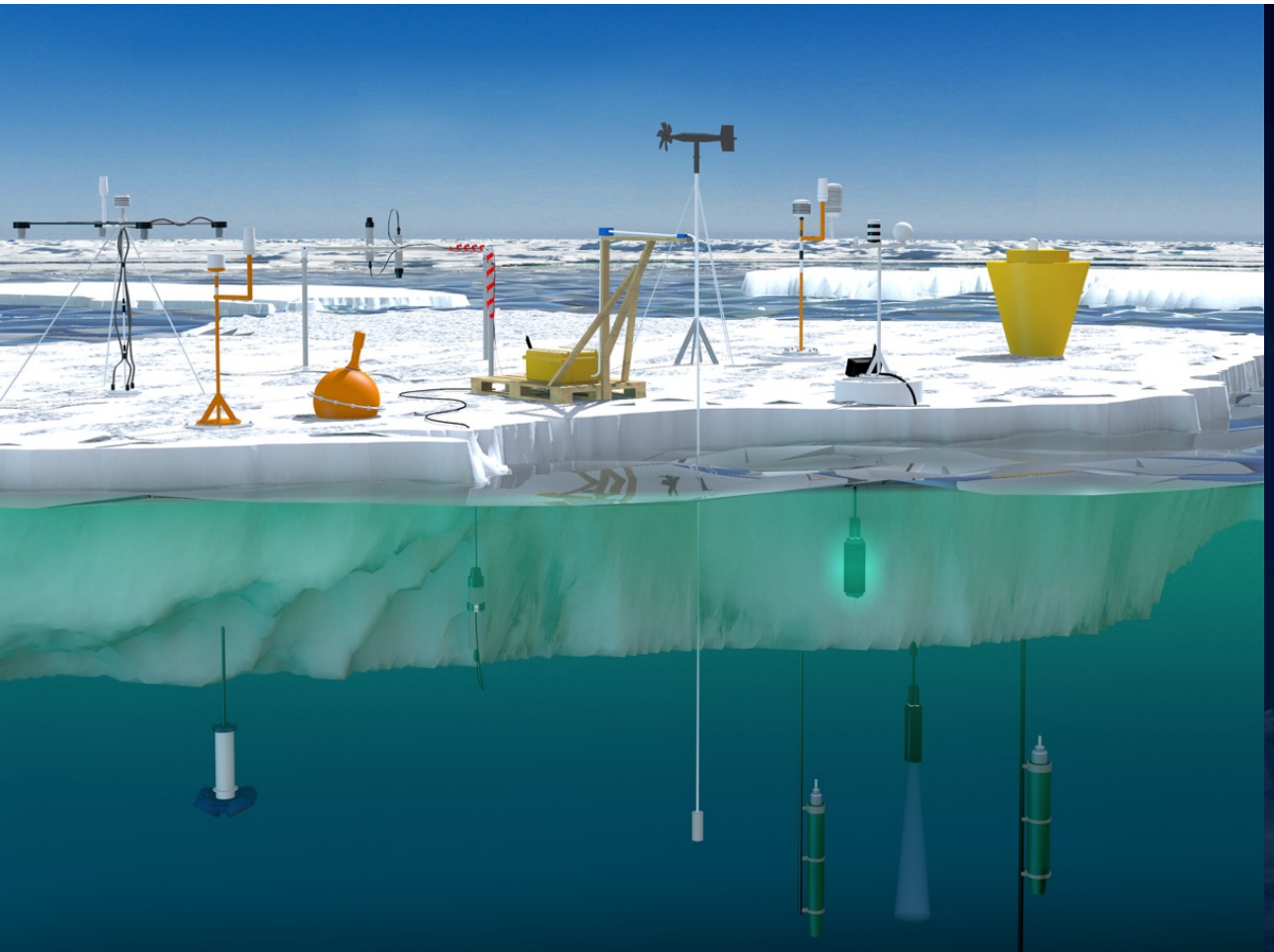
- Access to the field
- Dynamic environment
- Wildlife
- Harsh climate
- Data telemetry
- Limited navigation capabilities
- Sensitive electronics

Two recent initiatives:

FRAM

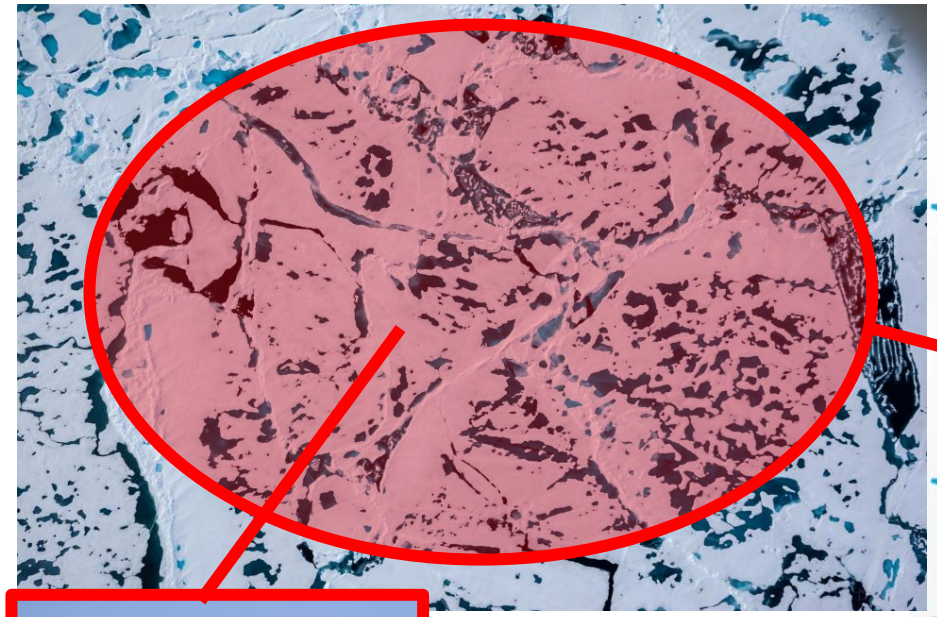
FRontiers in Arctic marine Monitoring

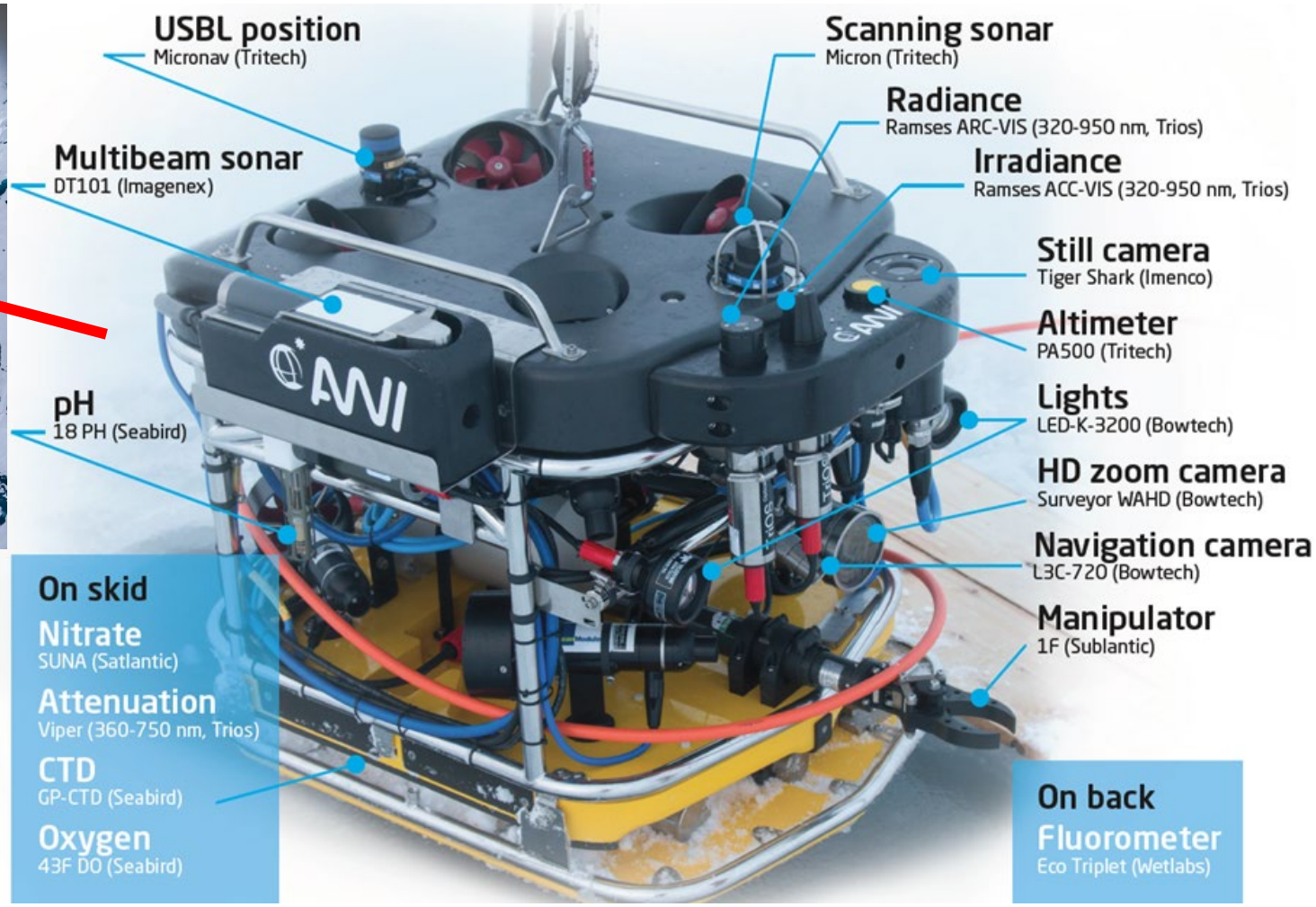
MOSAiC



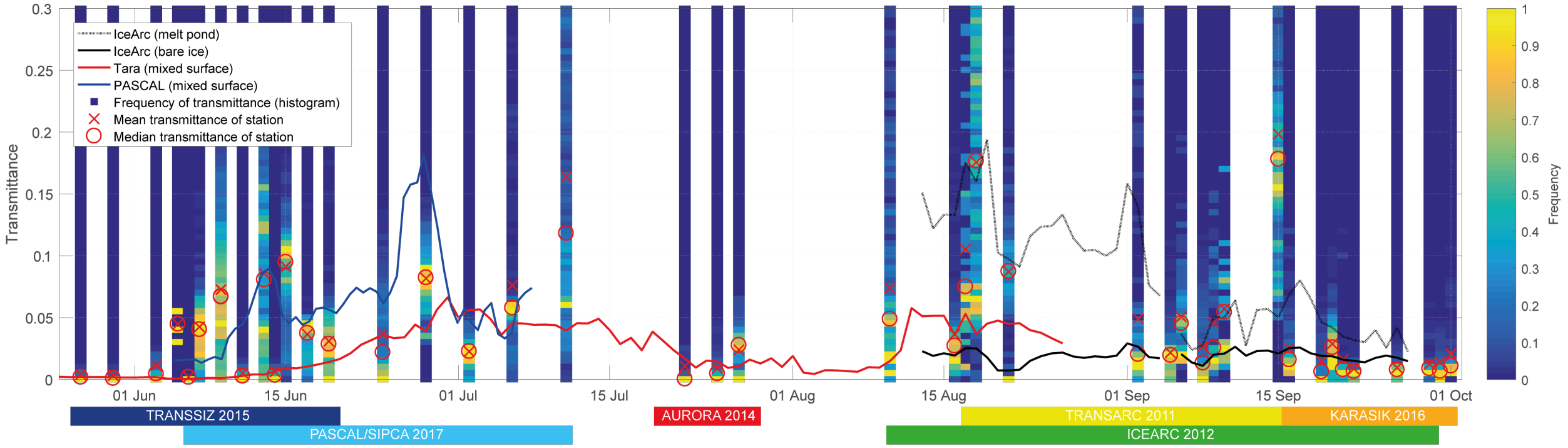
Underwater robots (e.g. Last Ice Area)

Under-ice ROV

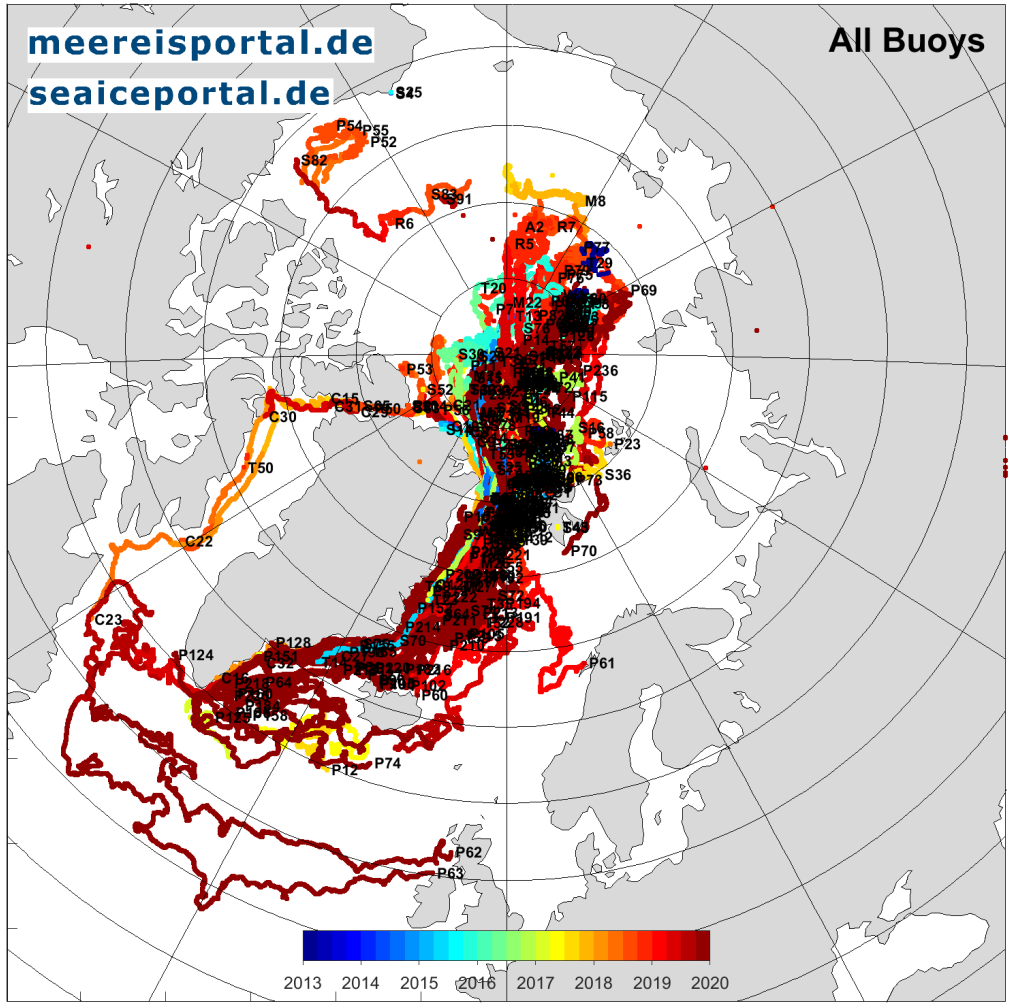




Investigating spatial variability



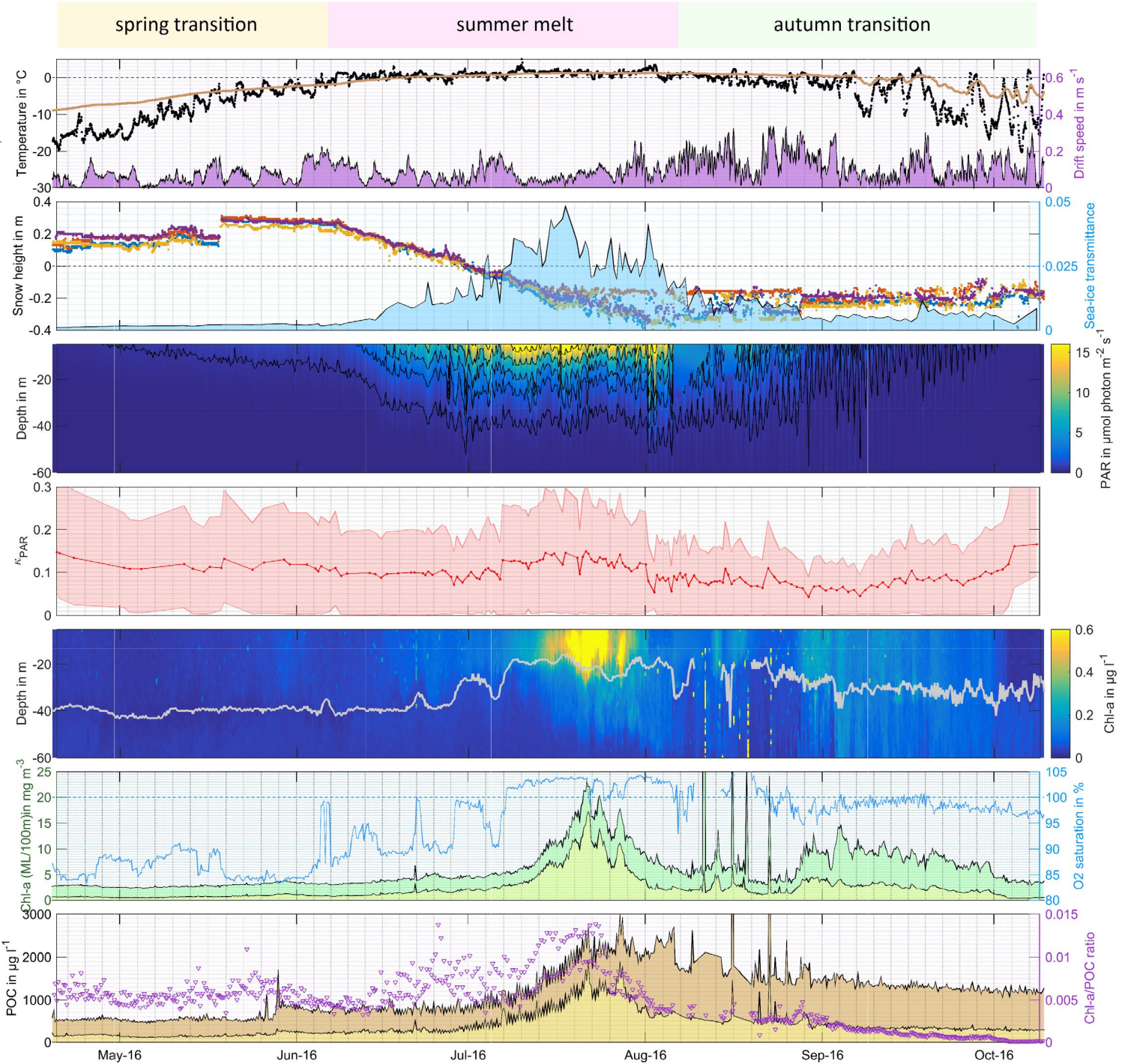
International Arctic Buoy Program



- International WMO Program
- GTS data delivery
  →weather forecasts

- Extension of physical parameters with bio-optical sensors.

Drifting observatories



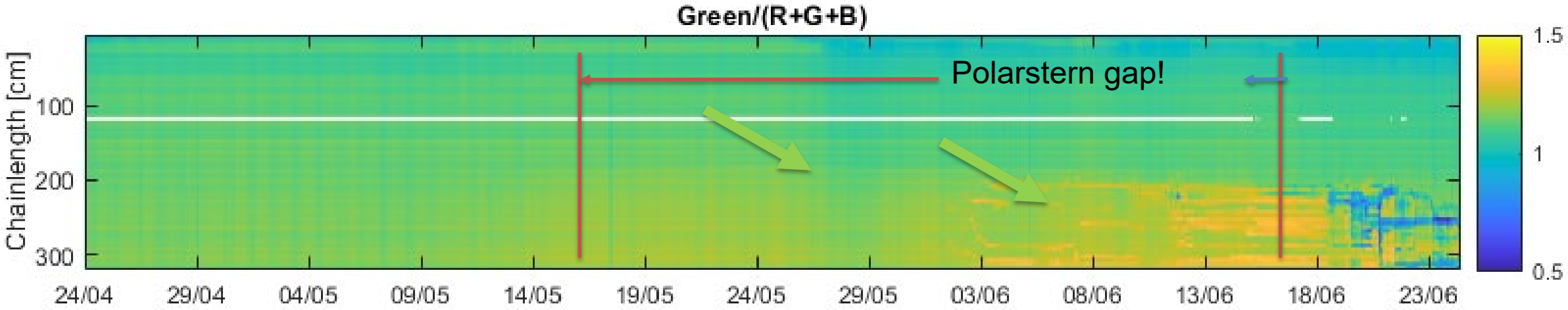
Radiation stations

- year-round
- autonomous

- solar fluxes

- albedo
- transmittance

Light sensor chain



Advances in IOP understanding: a missing link

novel observation technologies

physical properties (absorption/scattering)

Structural optical model

inherent optical properties (absorption/scattering)

Radiative transfer model

apparent optical properties (albedo/transmittance)

climate model parameterizations

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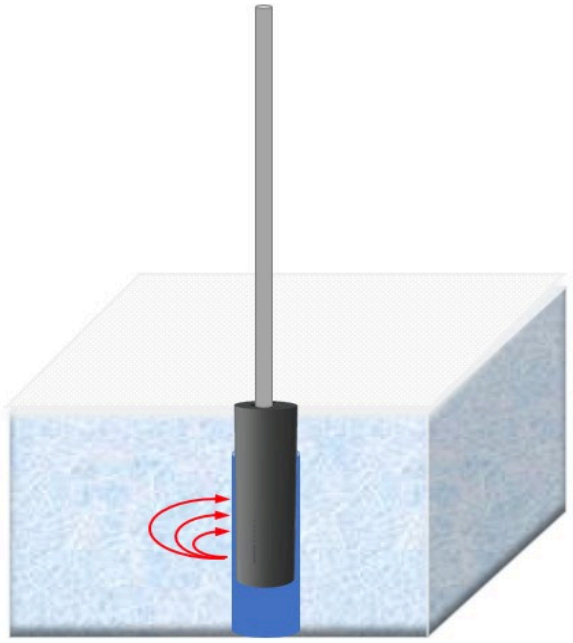
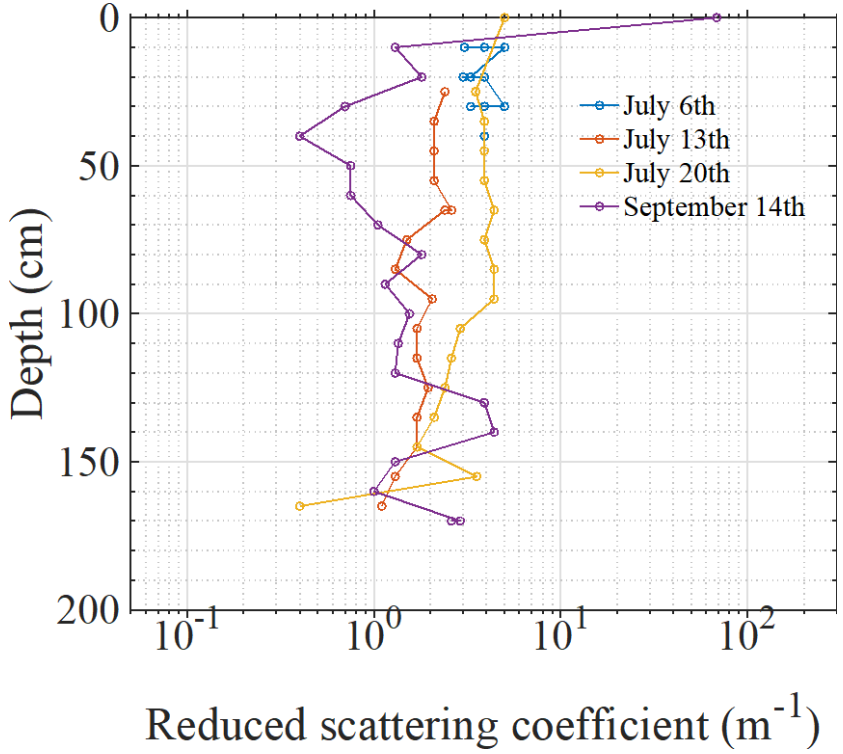
Sea ice endoscope

- Direct IOP measurements inside the ice





How does Arctic monitoring benefit the society?

- Sea ice is a means and hindrance to travel
- Understanding ecosystem services
- Inform decisions about protection of the last pristine areas
- Safe shipping observations: trade & tourism
- Crucial information for weather forecasting